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ABSTRACT

The purpose of this review is to determine the scientific status of the proposition that viewing television in general or viewing "Sesame Street" in particular affects children's attentional skills, abilities, or behaviors. It has been frequently claimed that television viewing negatively affects children's attentional abilities. The most common complaint is that rapid scene changes and movements on many television programs foster short attention spans. On these grounds, "Sesame Street" is sometimes cited as negatively affecting attentional abilities in its young viewers because the program uses short segments and varied pacing. Research literatures in communication, education, medicine, and psychology were extensively searched. A total of 10 relevant studies were found, four of which dealt with "Sesame Street." The research indicates that television may affect attentional abilities in children. Contrary to claims by journalists and educators, the effects appear to be positive as well as negative. Viewing of "Sesame Street" in particular is associated with an increase in desirable attentional skills and behaviors. Because relatively few studies have examined the effects of television viewing on attention and because many of the studies have methodological shortcomings, conclusions should be considered tentative. (RH)

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THE INFLUENCE OF TELEVISION ON CHILDREN'S ATTENTIONAL ABILITIES

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The Influence of Television on Children's Attentional Abilities

SUMMARY

It has been frequently claimed that television viewing negatively affects children's attentional abilities. The claims have been made primarily by journalists who have written articles and books directed at parents and by some educators. The most common complaint is that rapid scene changes and movement on many television programs foster short attention spans. On these grounds, Sesame Street is sometimes cited as negatively affecting attentional abilities in its young viewers due to the program's use of short segments and varied pacing.

In response to these concerns the producers of Sesame Street, Children's Television Workshop, commissioned this independent detailed review of the relevant scientific literature. The purpose of the review is to determine the scientific status of the proposition that viewing television in general or viewing Sesame Street in particular affects children's attentional skills, abilities, or behaviors. Research literatures in communication, education, medicine, and psychology were extensively searched.

Ten relevant studies were found, four of which dealt with Sesame Street. In addition, an eleventh report which dealt with Sesame Street was judged to be completely inadequate on scientific grounds and was not considered in the conclusions.

Although there were methodological problems with many of the studies, and none provided conclusive findings, a pattern of results emerged when studies were considered together.

The major results are: 1) One study found no evidence for immediate negative effects on attentional behavior from watching a single Sesame Street program as has been claimed. 2) Two studies found no evidence that viewing a series of Sesame Street programs has a negative effect on preschoolers' attentional behaviors as has been claimed. One study, however, found that after Israeli second grade children were required to watch Sesame Street in school for eight days, they were less persevering in doing a boring task. This is probably best explained as restlessness caused by the requirement to watch a TV program primarily designed for younger children. 3) Five studies found that watching educational television was associated with an increase in a variety of attentional skills. Three of these studies found this effect with the viewing of Sesame Street. 4) Four studies found that viewing of commercial television, especially violent action programs, was associated with impulsiveness, restlessness, and reduced self control in both preschool and school age children. 5) Only one study specifically examined the relationship between watching rapidly paced television and attentional abilities. This study found no effect of pacing.

Because relatively few studies have examined the effects of television viewing on attention, and because many of the studies have methodological shortcomings, conclusions should be considered tentative. Before strong conclusions can be drawn, these findings should be replicated in future studies, research should determine what aspects of television programming cause changes in attentional behaviors, and it should be determined whether there are enduring (long term) effects of television viewing on attentional abilities.

The research nevertheless indicates that television may affect attentional abilities in children. Contrary to claims by journalists and educators, the effects appear to be positive as well as negative. Viewing of Sesame Street in particular is associated with an increase in desirable attentional skills and behaviors.

The Problem

Because many American children spend large amounts of time watching television, concerns have been raised about the effects of television viewing on social, educational, and psychological development. Usually these concerns are directed at particular kinds of content, such as violence, shown on commercial entertainment television. Sometimes, however, the concerns are directed at the influence of television viewing in general. One such concern is the effect of television viewing on the attentional abilities of children. Critics have suggested that television viewing shortens children's attention spans, causes hyperactivity, and makes children impulsive. Because some of these critics have argued that even educational programs such as Sesame Street may have a harmful effect on children's attentional skills, Children's Television Workshop, the producers of Sesame Street, commissioned an independent review of the relevant scientific literature. This paper summarizes the findings of that review.

Background

Most of the alarm about the effects of television on attentional abilities has been raised by journalists who have written many sensational magazine and newspaper articles as well as books for parents. Examples of influential books written by journalists which make claims concerning the effects of television on attention are Moody (1980) and Winn (1977). Winn's book, The Plug-In Drug, has been particularly influential. The book cites the opinions of several physicians as the primary basis for statements about attention. A typical example is the following: "...there are incessant changes of camera and focus, so that the viewer's reference point shifts every few seconds. This technique literally programs a short attention span." (Dumont, 1976, as quoted by Winn, 1977, p. 14) Winn includes Sesame Street as among the television programs watched by children which may "...contribute to the frantic behavior observed with greater frequency among children today." Winn also suggests that young children's behavior "deteriorates" immediately after watching television. She quotes unnamed parents as characterizing their children being "hopped up" and "inattentive," including "wild running around," after a TV viewing session. Moody (1980) and others have written in a similar vein. No systematic scientifically based research is cited to support any of the journalists' claims about either short or long term effects of television viewing on attention.

Concern about television and attention has also been raised by professional educators who write in nonscientific educational publications. Joel Swerdlow (1981), for example, writes that "teachers complain about their pupils' passivity, short attention spans, and lack of imagination—characteristics attributable, at least in part, to TV viewing." (p. 52) Dorothy Cohen, an influential early childhood educator, frequently spoke to the public about the effect of television on attention: "...children whose environment is heavily dominated by the frantic pace and speed of television are children likely to be easily distracted. For them, focusing and paying attention are a strain." (Quoted by Moody, 1980, p. 48) Typical of such statements by educators is the lack of any evidence or systematic research.

These educator-critics have also received criticism by their peers. In responding to the idea that television causes short attention spans, Nancy Quisenberry and Charles Klasek (1977), educators at Southern Illinois University, write that such critics have "just discovered attention spans." They point out that it has long been known that the "child's attention span lengthens as he develops and begins to reflect, reason, and understand relationships logically." They argue that unsupported statements about television's negative influence on attention give "a characteristic to the child that was already recognized in children before a TV set was ever turned on in any home." (p. 56)

It is apparent that educators have taken both sides of the issue. One group argues

that the rapid pacing of television, including Sesame Street, may reduce attention span and increase restlessness; another group points out that young children have been characterized as having short attention spans and being behaviorally active long before the advent of television. The question, then, is whether there is any scientific evidence concerning the effects of television viewing on attentional abilities. Such evidence must not be merely opinion, speculation and anecdote, but instead it must be reliable, logically consistent, and methodologically sound.

The Nature of Scientific Evidence

Before reviewing the research, a brief discussion is in order as to what is meant by "scientific" evidence in relation to television viewing and attentional abilities. At a minimum, a scientific study should measure the variables of interest. There should be one or more measurements of the children's exposure to television programming and there should be one or more measurements of the children's attentional abilities or attention-related behavior. It is important that more than just a few children be examined, since it is often difficult to properly analyze the data if the study is based on only a single small sample.

Once the measurements have been obtained the resulting data should be analyzed using proper procedures of statistical analysis. Related to this is the idea of replication. Any scientific finding should be, at least in principle, replicable; that is, the procedures of measurement should be reported in sufficient detail so that another research group can repeat the study. The procedure and results, furthermore, should ideally be published in a refereed research journal. A refereed research journal is one that publishes a research report only after it has been carefully reviewed by two or more independent scientists who establish that the report is logically consistent, accurate, and uses appropriate methodology and data analysis.

Finally, the report should be clear as to whether it finds a cause and effect relationship between TV viewing and attention or whether it finds a correlation. A correlation is a statement of an association between two variables; for example, it has been reported that there is a positive correlation between viewing action television programs and restlessness in 9-year-old children. This means that those children in the study who watched more television at home were also observed to be more restless. While such a correlational finding is suggestive that there may be an effect of television viewing, it is not by itself proof. In this example, it could be that children who tend to be restless prefer to spend more time with television than children who are not restless. It could also be that a third factor causes both the television viewing and the restlessness; that is, a long spell of bad weather, for example, could lead to both increased television viewing and restless children. There are several methods that researchers can use to determine whether a cause and effect relationship does exist, and some of these methods have been used to explore the effects of television on attention.

Scope of the Research Review

Computer searches of research literature databases were done in the areas of education, medicine, and psychology. In addition, extensive library searches were conducted in each of these areas as well as in the area of communication research. Each reference was examined that mentioned television and children combined with attention, distractibility, hyperkinesis, hyperactivity, persistence, concentration, or impulsiveness as well as other identifiers.

Findings

Despite the public interest in the effects of television on attentional abilities, there are relatively few studies and experiments. Of the research that has been done, there is considerable variation in quality. It should also be kept in mind that there are many fac-

tors that can affect attentional abilities in children; it is a difficult task to disentangle the effects of television from the many other influences in children's lives. Nevertheless, some findings are consistent. Essentially five results have emerged: 1) There is no evidence for immediate effects of a session of television viewing on attentional abilities and behaviors of preschool children. 2) There is no consistent evidence that viewing Sesame Street has a negative effect on preschoolers' attentional abilities or behaviors. 3) There is evidence that viewing of educational television in general and Sesame Street in particular has a positive influence on attentional abilities and behavior. 4) Viewing of fantasy violence and realistic action violence is associated with increased impulsiveness and behavioral restlessness in both school age and preschool children. 5) A relationship between attentional abilities and rapid pacing on television has not been established. A summary of each of the major studies follows.

Anderson, Lorch, and Levin (1977)

This experiment, published in a refereed communication research journal, examined the effect of the pacing of Sesame Street on attentional skills and behaviors of 5-year-old children. Two special versions of Sesame Street were prepared: one version consisted of extremely rapidly paced short segments taken from four different Sesame Street programs, and the other version consisted of extremely slowly paced segments taken from the same four programs. Three groups of 24 children each participated in the experiment. One group was shown the rapidly paced program (each child viewed individually with a parent present), and another group was shown the slowly paced program. The third group did not view television at all; rather, a parent read stories to the child for the same length of time as the TV program.

Immediately following the TV viewing or reading, each child was given two tests of attentional abilities. One test measured attention and perseverance while solving a difficult jigsaw puzzle. The other test, which is commonly used in psychological research, measured impulsivity while doing a simple visual matching task. This second test examines the degree to which a child quickly answers a problem without carefully examining all the alternatives. Following the testing session, the children were observed for a 10-minute period while they played with toys. Each child's play was rated for activity level, time spent with each toy, and other measures of behavioral persistence and organization.

The analysis compared the three groups on the attentional measures and on play behavior. No consistent differences among the three groups were found, indicating that 1) there were no immediate short term effects of watching Sesame Street on attentional behavior, and 2) there was no immediate effect of extremely rapid pacing of television. The study also obtained parents' estimates of the total amount of time the children watched television at home. No relationship was found to the test or play observation results.

Comment This experiment, which was designed to test for a cause and effect relationship, found no immediate influence of rapid pacing or of viewing Sesame Street on preschoolers' attentional abilities. In addition, no relationship was found between total viewing and attentional abilities.

Anderson and McGuire (1978)

Published in a refereed educational research journal, this study examined the relationship between TV viewing and educational achievement in Canadian school aged children (102 third and fourth graders, 198 fifth and sixth graders). Part of the study included teacher ratings of the children's impulsivity at school. The measure of TV viewing consisted of the number of programs checked off by the child from a list provided by the researchers. The authors found a small positive correlation between impulsivity and

viewing of violent programs in third and fourth graders, and also with total viewing in fifth and sixth graders.

Comment This study does not allow any conclusion of cause and effect; it indicates only that there is an association of amount of television viewing, particularly of violent programming, with impulsivity.

Friedrich and Stein (1973)

This experiment was published in a refereed psychological research journal. Three groups of preschool children were studied while attending a preschool summer session. For four weeks during the session each group was shown a total of 12 TV programs. One group of 30 children was shown aggressive fantasy-action programs (Batman); another group of 30 children was shown a preschool program from public television (Mister Rogers' Neighborhood); and the third group of 40 children viewed a variety of children's programs which contained no aggression and did not emphasize the helping prosocial content that is taught in Mister Rogers' Neighborhood.

The children were observed in their classroom for persistence in carrying out assigned tasks as well as persistence in play. The children were also observed for their tolerance of delay, which was defined as voluntarily waiting for materials or adult attention for one minute when they were not immediately available.

The results indicated an increase in tolerance of delay for the children who viewed Mister Rogers' Neighborhood and for those who viewed the variety of nonaggressive children's programs. The children who viewed Batman showed a decrease in tolerance of delay. The results for task persistence were more complicated: only those children who scored above the middle in intelligence were affected. Within this bright group, the children who viewed Batman became less persistent, and those children who viewed Mister Rogers' Neighborhood became more persistent, with the group who viewed a variety of nonaggressive programs showing little effect.

Comment This experiment indicates that effects of television depend on the particular programs viewed. This indicates that television viewing per se may not affect attentional abilities but that certain types of programming do have an effect. Because there are many differences among the three types of programs shown to the children in this experiment, it is difficult to determine with certainty which aspects of the programs had the most influence. The authors hypothesized the critical factors were aggressive content producing negative effects, and helping, prosocial content producing positive effects.

Gadberry (1980)

This experiment was published in a refereed psychological research journal. Two groups of 6-year-olds were the subjects of the research. Parents of one group (15 children) were asked to restrict their children's TV viewing for a 6-week period, while parents of the other group (13 children) were simply asked to interact with their children for 20 minutes a day. Follow-ups indicated that children in the restricted group viewed about half as much television during the 6-week period as the children in the unrestricted group. Among the outcome measures was the same test of impulsivity used by Anderson, Levin and Lorch (1977) as described above.

The results showed that the restricted children primarily reduced commercial TV viewing. They were less impulsive than the unrestricted children. In addition, detailed analysis showed that those children who primarily watched Sesame Street and The Electric Company were less impulsive than the children who watched commercial television, especially violent programs.

Comment This experiment indicates that reducing viewing of commercial entertainment television may reduce impulsiveness in children. Again, viewing violent television programs is implicated in relation to impulsive tendencies in children.

Halpern (1975)

This study describes a group of 2-year-old children who were referred to a mental health center for problems with hyperactivity. The communications journal in which the report was published does not routinely submit articles for scientific review. A majority of the children were described as compulsively reciting numbers and letters learned from Sesame Street. In addition, Halpern notes that "while they delivered themselves of these speech fragments, the children often inspected their inanimate surroundings like restless, wound-up robots." (p.68) Halpern suggested that the children's hyperactivity was "directly traceable to Sesame Street." He argued that rapid pacing and repetition of the show " evidently may be too much for some children to assimilate or to avoid successfully. When their nervous systems become overtaxed, they resort to diffuse tension discharge behaviors, exemplified by unfocused hyperactivity and irritability." (p.69) In a footnote at the conclusion of the paper, Halpern notes that subsequent observations of children at the mental health center did not replicate these findings.

Comment This paper received very wide publicity, producing headlines such as "Sesame Street Hazard." The paper is also extensively referred to in the sensational books written for parents by journalists. None of the principles of adequate scientific research were followed in this report. There was no statement of the number of children observed, no indication of their backgrounds, no statement of other possible causal factors in their hyperactivity, and no attempt to determine whether normal children of the same age who watched Sesame Street also recited numbers and letters. Since no other reports of this type have appeared in the medical, psychological, educational, or communications literature, and since Halpern was not able to replicate his own observations, this paper should be judged as anomalous and inadequate as a scientific study.

Salomon (1979)

As part of a book on media and learning, Salomon reported a series of studies with Israeli preschool and school age children. Books of this type are not ordinarily submitted to scientific review as a condition of publication. Salomon points out that at the time the research was done, Israeli children had limited familiarity with television, especially television produced for children.

In the first study a group of 20 eighth graders was shown three films, each of which examined a Breughel painting. The camera zoomed in on details of the paintings then zoomed back to show the relationship of each detail to the whole painting. The children were given tests of their ability to focus on visual details in a complicated picture both before and after watching the films.

The children performed better on the attention task after watching the film as compared to a group of 20 children who did not see the films. Those children who were initially poor at the attention task improved a great deal following the film experience, whereas those children who were initially good at the attention task performed more poorly following the films. Salomon interpreted the results as indicating that the film technique (also commonly used in television) could teach attentional skills to children who are deficient in those skills. Children who have mastered those skills, however, may learn attentional strategies that are less effective than those they already know.

In a second experiment 14 eighth graders were tested in a replication of the first experiment. In this case, there was no difference on the attention test between the group that saw the films and another group that did not. The children who initially scored poorly on the attention focusing task did about the same after seeing the films, whereas those children who initially had high scores did more poorly as in the first experiment. This experiment, therefore, did not fully replicate the findings of the first experiment.

Comment These studies indicate that children may learn attentional strategies from observing camera zooming techniques. In some circumstances these techniques may improve attentional skills, and in other circumstances the children may learn atten-

tional skills that are less appropriate than the ones they already know. There are problems with these studies. Children who initially score low on a test will tend to score higher when tested again, whereas children who initially score high will tend to score lower when tested again. Technically, this is called "regression to the mean." This phenomenon can make interpretation of results such as those found by Salomon somewhat ambiguous. In addition, Salomon comments on a number of other methodological problems. Combined with the failure to completely replicate the findings, these studies are at best suggestive that children may learn attentional strategies from television.

In a third study Salomon examined Israeli children during 1971 after Sesame Street was first broadcast in Israel. The children included 95 preschoolers, 106 second graders, and 118 third graders. All the children were given a battery of tests prior to the introduction of the program. At the end of the broadcast season they were given the same battery of tests. Among the tests were several that examine the attentional ability to separate a figure from its background and to relate a close-up view of an object to a view of the object from a distance.

The results indicated that there was little effect on the preschool children. Those children who watched a great deal of Sesame Street scored about the same on the attention skills tests as those who watched relatively little. For both the older groups (second and third graders) the heavier Sesame Street viewers scored substantially better on the attentional skills than the light viewers.

Comment The results of this study suggest that young school age children may learn attentional skills from watching Sesame Street. Cause and effect, however, cannot be strongly inferred from this type of study because it is possible that children who were heavier viewers of Sesame Street may have been systematically different from light viewers in some way not measured by Salomon. This unmeasured difference could in principle produce the development of improved attentional skills as compared to the light viewers.

In a final experiment Salomon showed Sesame Street programs at school over eight days to 57 second graders. A comparison group of 57 second graders watched adventure and nature films for the same amount of time. The same tests of attention skills were given as in the previous study, and, in addition, a "tedious" test of perseverance was given which required the child to cross out certain numbers on several pages of random numbers.

The results verified the previous study. After watching Sesame Street, the children did better on the tests of attentional skills than did the children who watched the adventure and nature programs. The one exception, however, was on the perseverance task: the children who watched Sesame Street showed less perseverance than the comparison group.

Comment This experiment indicates a probable cause and effect relationship between viewing Sesame Street and increasing attentional abilities. The results of the perseverance test, however, indicate poorer performance. This tendency to persevere less in a boring task may have been due to restlessness caused by the children being required to watch eight hours of a TV program intended primarily for a younger audience.

Singer, Singer, and Rapaczynski (1984)

The study is reported in a communication journal which does not routinely submit papers for scientific review by referees. The study examines 63 nine-year-olds. The children were observed for restlessness in a waiting room, and they were also tested for their ability to sit still for a length of time. Records of the children's TV viewing for the previous two years were available since the children were part of a larger study which had been going on since the children were four.

The authors reported that viewing of action-oriented TV programs was associated with restlessness in the waiting room. Although weaker, the viewing of action TV programs was also associated with less ability to sit still for an extended period of time.

Comment. Although strongly suggestive, one cannot directly infer from this study that television viewing causes the restlessness or reduced ability to sit still. Again, it is possible that some unmeasured factor causes both a tendency to prefer action television programs as well as restlessness.

Tower, Singer, Singer, and Biggs (1979)

This experiment is reported in a psychiatric journal which does not routinely submit papers for scientific review by referees. Three groups of children were studied in their preschools. One group of 21 children was shown a Mister Rogers' Neighborhood program each day for 10 days; another group of 21 was shown Sesame Street; and the third group of 16 was shown a collection of educational films about animals, health, and nature. Among the measures were observations of the children's concentration which was defined as the extent to which a child remained with an activity throughout the observation period, resisting distraction and not engaging in hyperactive behaviors. Also measured was imaginativeness. The authors hypothesized that children who were low or high in imaginativeness would be affected differently by these three types of programs.

The results were reported in terms of changes in concentration by low and high imaginative children. For all three programs there was no difference in concentration for high imaginative children (who tended to be high in concentration initially), but low imaginative children substantially increased their concentration in all three TV viewing conditions.

Comment. This experiment is suggestive that the kind of programming intended for preschoolers on public television will increase concentration in some children who are less imaginative. Since imaginativeness is strongly related to concentration in this study, however, there is a problem that the children who are initially low in imaginativeness were also likely initially low in concentration. Subsequent observation of these children would tend to show an increase in concentration even if the television shows had no effect. This again is the problem of regression to the mean.

General Summary and Conclusions

Earlier extensive reviews of research have concluded that there is little evidence that television influences children's attentional abilities. (Hornik, 1981; Zillmann, 1982) Since those reviews were done, more research has become available. Although no single study is conclusive, a pattern of findings has emerged. Television viewing may indeed have an influence on attentional behaviors. The nature of this influence, however, is not uniformly negative as journalists and educators have hypothesized. Educational TV programming, including Sesame Street, is by and large associated with an increase in attentional abilities. This effect is not immediate but requires cumulative exposure to at least several programs. The experimental design of some of the research indicates that the association may be causal; that is, educational and prosocial TV viewing may produce increased attentional skills even though the programs are not necessarily designed to teach these skills. It should be pointed out that several of the studies have results suggestive that specific subgroups of children may be influenced more than others. Not enough studies are sufficiently comparable to allow making generalizations about which subgroups are most likely to learn attentional skills from television.

There is also a negative side to the pattern of results. Viewing of violent action-oriented entertainment television has small but consistent associations with greater impulsivity, restlessness, and reduced self-control. There is not enough research yet to

conclude that violent action programming actually causes negative changes in attentional behaviors.

Overall there is relatively little research on the effects of television viewing on children's attentional abilities. Much of the research that has been reported has not been subjected to rigorous scientific review, and some of the studies do not well describe the methodology used. Where effects and associations with attentional skills have been found, none of the studies have identified what aspects of television may be responsible. Despite hypotheses concerning the negative influence of rapid pacing, for example, only one study directly examined pacing. This study found no effect.

Most importantly, there have been no intensive studies of the long term effect of television viewing on a wide array of attentional skills. Such research would be difficult and expensive. Nevertheless, until it is done, conclusions can only be tentative: Television may indeed influence children's attentional skills, but if so, the influence appears to be positive as well as negative.

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